

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Application of: Jurgen Osterlanger : Examiner: Waits, Allan B.  
Appln. No.: 10/538,908 : Art Unit: 3682  
Filed: June 14, 2005 : Confirmation No.: 5799  
Title: DRIVE DEVICE COMPRISING : Dated: April 22, 2009  
A ROLL BODY SCREW

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**RESPONSE**

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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1450, Alexandria, VA 22313-1450 on April 22, 2009.

LUCAS & MERCANTI, LLP  
BY:   
Donald C. Lucas, Reg. No. 31,275

Sir:

This is in response to an Office Action dated March 18, 2009. Attached are a Drawing Replacement Sheet, Claim Amendments, Specification Amendments and Remarks each starting on a separate page.

## CLAIM AMENDMENTS

Please amend the claims as follows:

1. (Currently Amended) A drive device comprising: a rolling-body screw mechanism having an axis of rotation; a housing divided into two housing parts transversely to the axis of rotation of the screw mechanism; a hollow rotor mounted rotatably and secured within a hub mounted on a spindle nut of the screw mechanism; a threaded spindle of the rolling-body screw mechanism mounted rotatably on the spindle nut of the rolling-body screw mechanism, the spindle nut being drive-connected to the rotor; and a rolling mounting means for rotatably mounting the rolling-body screw mechanism in the housing provided on only one housing part of the housing, wherein the rolling mounting means is formed by a multi-row angular ball bearing having an outer ring seated in a housing bore of the one housing part, and wherein ball grooves of the angular ball bearing are formed directly on an outer circumference of the spindle nut, and wherein the mounting means is positioned with respect to the spindle nut to carry the spindle nut, the hub and the hollow rotor receive all of the loading there from in a cantilevered manner.

2-3. (Previously Canceled)

4. (Previously Presented) The drive device according to Claim 1, wherein the rolling mounting means is arranged axially within a construction space occupied by the spindle nut.

5. (Previously Presented) The drive device according to Claim 1, wherein the rotor is arranged axially within a construction space occupied by the spindle nut.
6. (Previously Presented) The drive device according to Claim 1, wherein the rolling-body screw mechanism is a ball screw mechanism with an outer deflection for balls of the ball screw mechanism.
7. (Previously Presented) The drive device according to Claim 4, wherein the rolling body screw mechanism is a ball screw mechanism with an outer deflection for balls, and the spindle nut is provided, in a region radially between the threaded spindle and the rolling mounting means, with a return bore for balls of the ball screw mechanism.
8. (Previously Presented) The drive device according to Claim 1, wherein the rotor is provided with a driving surface for drive belts.
9. (Currently Amended) A drive device comprising: a rolling-body screw mechanism having an axis of rotation; a housing divided into two housing parts transversely to the axis of rotation of the screw mechanism; a hollow rotor mounted rotatably and secured within a hub mounted on a threaded spindle nut of the screw mechanism; a threaded spindle of the rolling-body screw mechanism mounted rotatably on the spindle nut of the rolling-body screw mechanism, the spindle nut being drive-connected to the rotor by means of the hub at a position that is axially displaced from the threads of the spindle nut; and a rolling mounting means for rotatably mounting the rolling-body screw mechanism in the housing

provided on only one housing part of the housing, wherein the rolling mounting means is formed by a multi-row angular ball bearing having an outer ring seated in a housing bore of the one housing part, and wherein ball grooves of the angular ball bearing are formed directly on an outer circumference of the spindle nut.

## **SPECIFICATION AMENDMENTS**

In the section entitled List of Reference Numerals on page 7, please delete reference numeral 8 as shown below.

1 Drive device	29 Ball
2 Housing	30 Return hose
3 Housing part	31 Outer deflection
4 Housing part	
5 Screw	
6 Rotor	
6a Driving surface	
7 Belt	
8	
9 Hub	
10 Spindle nut	
11 Ball screw mechanism	
12 Angular ball bearing	
13 Outer ring	
14 Housing	
15 Ball row	
16 Ball row	
17 Ball	
18 Ball groove	
19 Ball groove	
20 Threaded spindle	
21 Ball	
22 Ball screw mechanism	
23 Outer deflection	
24 Ball	
25 Angular ball bearing	
26 Outer ring	
27 Spindle nut	
28 Ball groove	

## REMARKS

### Request for Reconsideration

The Applicants have carefully considered the matters raised by the Examiner in the outstanding Office Action, but remain of the position that patentable subject matter is present. The Applicants respectfully request reconsideration of the Examiner's position based on the amendments to the claims and the following remarks.

### Present Invention

The present invention is unique in the positioning and resulting loading of the ball screw mechanism which allows loads to be received in a cantilevered manner and not through a direct radial transfer. Further, the present invention's use of the spindle nut as an inner ring to provide a more compact design and also reduces the overall weight of the structure. A hub adds protection to the rotor because the rotor is mounted within the hub. Thus, vibrations from the spindle and spindle nut are prevented from being directly transferred to the rotor.

### Drawing and Specification Amendments

Figure 1 contains a reference character that is not necessary and does not point to any subject matter discussed in the specification or claims. Thus, reference character 8 has been removed from Figure 1 and also from the list of reference numbers in the specification for consistency.

### Claim Status

Claims 1 and 4-9 are pending. Claims 2 and 3 had been previously canceled. Claims 1 and 9 have been amended herein. These amendments will be discussed in more detail below.

### Claim Rejections – 35 U.S.C. § 112

Claim 1 had been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctively claim the subject matter which the Applicants regards as the invention. Specifically, the Examiner stated that claim 1 recites the limitation “the load” and there is insufficient antecedent basis for this limitation in the claim.

Claim 1 has been amended herein to recite the load which is carried by the mounting means. Probably the best support for this amendment is in Figure 1, which shows the bearing carrying the spindle nut, the hub, and the rotor. It is submitted that this amendment should be entered because it addresses the 35 U.S.C. § 112 rejection.

### Claim Rejection – 35 U.S.C. § 103

Claims 1, 4, 5 and 9 had been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatewaki, *et al.* (U.S. Patent Application 2002/0148672) in view of Saruwatari, *et al.* (U.S. Patent Application 2002/0096389). Claims 6 and 7 had been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatewaki in view of Saruwatari as applied to claims 1 and 4 and further in view of R.E. Osborne (U.S. Patent 2,964,967). Claim 8 had been rejected under under 35 U.S.C. § 103(a) as being

unpatentable over Tatewaki in view of Saruwatari as applied to claims 1 and further in view of Bugosh (U.S. Patent Application 2003/0192734).

Claim 1 and 9 has been amended to better define the location of the hollow rotor in relation to adjacent components of the rotor and which can be seen in Figure 1.

However, the Applicants respectfully disagree that claims 1 and 9 are unpatentable over Tatewaki, *et al.* in view of Saruwatari, *et al.* First, assuming the deceleration gear (FIG. 2, 102) of Tatewaki is the same as the hollow rotor (6) of the present invention, the rotor of Tatewaki is mounted directly on the spindle nut, the rotor of the present invention is mounted within a hub (9). The hub of the present invention offers better protection from vibration, wear and corrosion to the rotor than Tatewaki where the rotor is placed in direct contact with the spindle nut. Thus, the rotor of the present invention is not mounted in the same manner as the rotor of Tatewaki.

Second, the Applicants respectfully disagree that the mounting means of Tatewaki are positioned with respect to the spindle nut to receive all of the loading there from in a cantilevered manner. As discussed in the Applicants previous response and further clarified herein, the location of the angular contact ball bearing, outer ring and balls of the present invention are positioned within the housing of the drive device at the end in close proximity to the ball screw mechanism and the spindle nut has ball grooves that act as an inner ring for the bearing. The bearing of Tatewaki is not positioned such that the spindle nut is used as an inner ring. Moreover, the ball screw mechanism is not positioned in close proximity to the bearing, rather the ball screw mechanism is positioned a distance away from the bearing and housing. The Applicants acknowledge that Saruwatari teaches ball grooves of the ball bearing being formed directly on the outer circumference of the spindle

nut. However, similar to Tatewaki, the ball screw mechanism of Saruwatari is not in close proximity to the bearing and housing. Thus, the load generated along the spindle is not transferred to the bearing in a cantilevered arrangement or where the bearing would be axially displaced from the load in either Tatewaki or Saruwatari. Rather the load generated in Tatewaki and Saruwatari is a direct radial loading due to the position of the ball screw mechanism which is located located a significant distance from the bearing.

Third, the Applicants further disagree that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Tatewaki and provide ball grooves of the angular ball bearing directly on an outer circumference of the spindle nut of Saruwatari. Significant structural modifications to Saruwatari would be required for ball grooves of the angular ball bearing to be directly on the outer circumference of the spindle nut and for the electric power steering apparatus of Saruwatari still function in its intended manner. The modifications would require extensive redesign to the overall structure of the electric power steering apparatus as all components of Saruwatari are fixed in a compact manner which depends upon the position of mating components. At a minimum, the hub and outer ring would have to be redesigned to ensure the balls of the bearing are still in secure contact with the outer ring and now spindle nut. Removing the inner race which currently is fixed between the balls and spindle nut would create a gap that would be too great for the bearing to work efficiently without extensive redesign to the overall component. Retooling machinery or potentially remaking castings, in the case of the hub, would be an extremely time consuming and expressive process. Thus, although Saruwatari teaches ball grooves on the ball bearing

formed directly on an outer circumference of the spindle nut, it would not have been obvious to one of ordinary skill in the art at the time of the invention. Therefore, claims 1 and 9 are patentable over Tatewaki in view of Saruwatari.

Since claims 4-8 are ultimately dependent on claim 1, claims 4-8 are also patentable over the prior art referenced.

Conclusion

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance and such action is respectfully requested. Should any extensions of time or fees be necessary in order to maintain this Application in pending condition, appropriate requests are hereby made and authorization is given to debit Account Number 02-2275.

Respectfully submitted,

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# Replacement Drawing Sheet

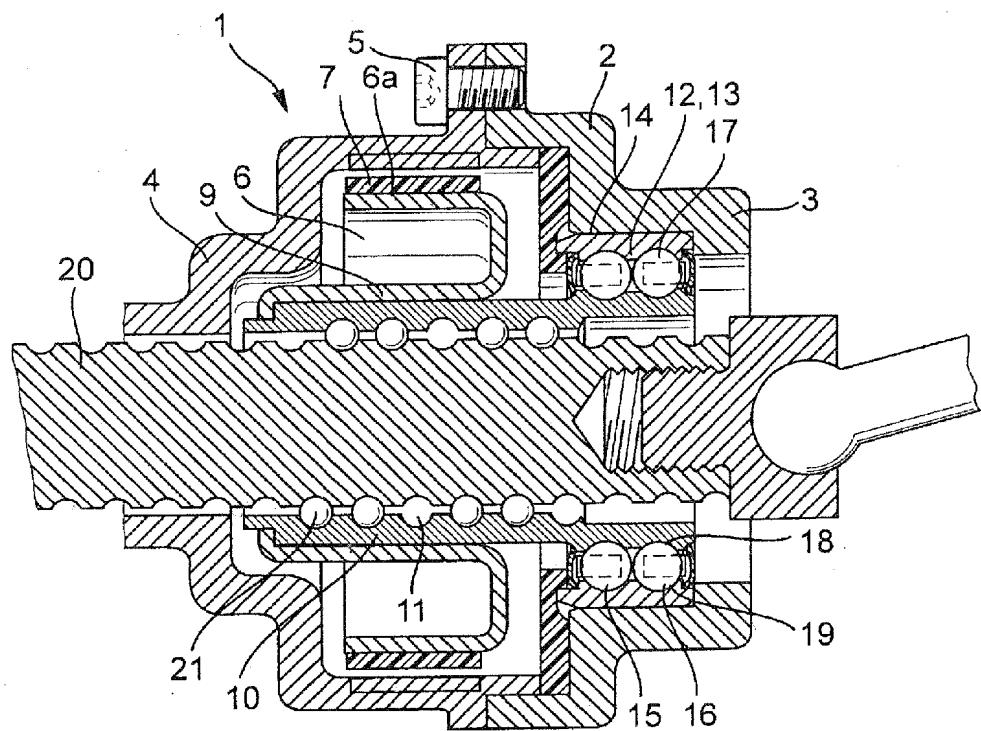


Fig. 1

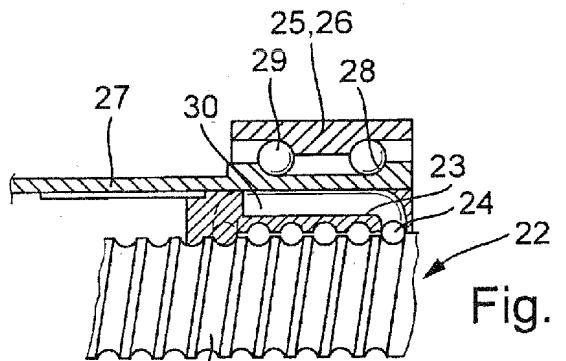


Fig. 2

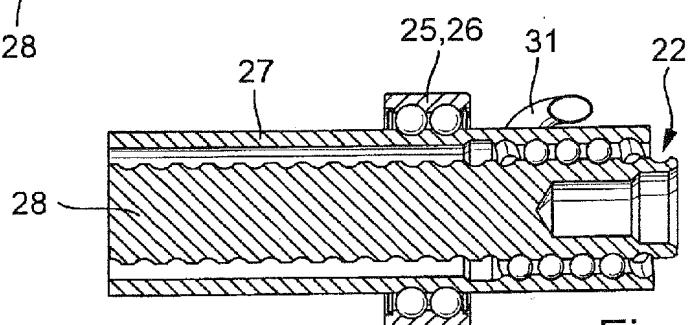


Fig. 3